

PATENT SPECIFICATION



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COMPLETE SPECIFICATION

A Process of Treating Textile Fabrics to Improve Their Resistance to Abrasion

We, FONTAINE CONVERTING WORKS, INCORPORATED, of Highway No. 707, Martinsville, State of Virginia, United States of America, a Corporation organised under the Laws of the State of Virginia, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in 10 and by the following statement:—

This invention is for a process of treating textile fabrics to improve their resistance to abrasion that commonly occurs on fabrics or garments made from certain synthetic fibres, 15 particularly fibres known in the trade as "DACRON," "ORLON" Registered Trade Marks and nylon.

It has been found that fabrics or garments made from these synthetic fibres or mixtures 20 thereof with other fibres, when subjected to abrasion such as ordinarily encountered in wearing or laundering, will produce "pills" or small balls of the abraded fibres that do not fall off or become separated from the 25 fabric, but adhere to it and produce a very unattractive surface appearance. This effect is in contrast to the abrasion effects experienced with wool and other natural fibres, and in which pills or balls either do not form 30 on the surface of the goods or if they do form they break off, leaving a smooth uniform surface. It appears that the pills or balls formed on the synthetic fibre materials do not break or fall off because of the increased strength and perhaps other characteristics of these fibres different from the 35 natural fibres.

This pilling problem has become acute in view of the fact that the synthetic fibre fabrics and garments exhibit this undesirable 40 surface effect after relatively short periods of wear or washing. In suiting materials, the pilling effect shows up mainly on collars, cuffs, sleeves and other portions of the garments that normally rub against each other

or against other surfaces during wear of the garment, and as a result of this abrasion, even though slight, numerous pills or balls form on the surface. This undesirable effect is especially noticeable and pronounced in 50 knitted wear, such as sweaters made of "DACRON," "ORLON" Registered Trade Marks or nylon. The numerous pills formed on the surface of the sweaters adhere so tenaciously that they cannot be removed by 55 usual brushing.

In accordance with the present invention there is provided a process for treating textile fabrics comprising synthetic polyester or acrylic or long-chain polyamide fibres to 60 minimize pilling effects on abrasion comprising treating the fabric, at a temperature of at least 350 F. but not sufficient to harm the fabric with a liquid having its boiling point above the temperature of treatment, wash- 65 ing the thus treated fabric to remove substantially the treating liquid and subsequently drying the fabric.

In a commercially advantageous example of the process of our invention, we subject 70 the fabric to an impregnation treatment with a non-aqueous, water soluble liquid that quickly heats the fabric to the temperature of the liquid and effects rapid penetration thereof by this liquid. In fact, the penetration is 75 sufficiently deep and uniform that a small amount of the treating liquid will remain embedded in the fibres of the fabric even after thorough washing and drying of the fabric. This small residual impregnant in the fabric 80 aids in identifying textile materials that have the non-pilling characteristic established therein by treatment of the fabric at a high temperature with the highly heated liquid.

In carrying out the process of our invention, we have found that ethylene glycol or diethylene glycol can be easily and effectively used as the liquid which is heated to a high temperature for treatment of the fabric. Also, it appears from experience that other liquids 90

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such as for example, glycerine, mineral oil and ethanolamines would function effectively in this process.

It is to be understood that the process of our invention is not limited to the use of these specific liquids but that any liquid having a sufficiently high boiling point that it will not boil or evaporate when heated to the desired high treating temperature may be used. This excludes water and other low boiling solvents, but includes those numerous liquids that will withstand the process temperature and will not adversely affect or damage the fabric.

15 The operating temperature for heat treatment of the fabric will vary with the type of fibre, and particularly its resistance to heat. For example, when treating "DACRON" Registered Trade Mark, fabrics, the temperature should not go substantially above 365°F., with "ORLON" Registered Trade Mark, about 370°F., and with nylon about 365°F. In general, the liquids used will have a boiling point within the range of about 25 350°F. to 550°F., should not harm the fabric, and should be removable from the fabric after the heat treatment has been completed.

The following are illustrative but non-limiting examples of the process of our invention, in which synthetic fibre textile fabrics are treated at high temperatures to prevent or minimize pilling effects.

EXAMPLE 1

A clean, dry, "DACRON" Registered Trade Mark, fabric is passed through a bath of diethylene glycol heated to a temperature of approximately 360-365°F. We have found that the effectiveness of this treatment can be obtained almost immediately, that is, within 40 about ten seconds treatment of the cloth in this highly heated diethylene glycol bath. After the "DACRON" Registered Trade Mark fabric passes through this liquid bath, the surplus diethylene glycol 45 is squeezed off by squeeze rolls or the like and the treated cloth is then passed through a water bath which removes substantially all of the diethylene glycol but leaves a very small amount of the diethylene glycol entrapped in the "DACRON" Registered Trade Mark fibres. After washing with water, the fabric is dried and may be used as such or dyed or otherwise finished as desired.

EXAMPLE 2

A clean, dry, "ORLON" Registered Trade Mark, fabric is passed through a bath of diethylene glycol heated to a temperature of approximately 370°F. This temperature is 60 sufficiently high to effect incipient softening of the "ORLON" Registered Trade Mark, and enables penetration thereof by the diethylene glycol. The treatment is carried out for about eight to ten seconds time, after 65 which the excess diethylene glycol is

squeezed out of the fabric and the fabric then subjected to washing with water and finally dried.

EXAMPLE 3

Nylon fabric, properly cleaned and dried, 70 is passed through a bath of diethylene glycol heated to a temperature of approximately 365°F. This temperature is sufficiently high to effect incipient softening of the nylon and enables penetration thereof by the diethylene glycol. The treatment is carried out for about eight to ten seconds time, after which the excess diethylene glycol is squeezed out of the fabric and the fabric then subjected to washing with water and finally dried. 80

In the event other similar non-aqueous, non-evaporative, water soluble liquids are used for effecting the treatment, such as, for example, ethylene glycol, glycerine or ethanolamine, the procedures described in Examples 1, 2 and 3 above would be generally followed with any necessary adjustments of the temperature for the specific treating liquid, although in general the temperatures would be of the same high order and sufficient to effect penetration of the synthetic fibre fabric with the highly heated treating liquid, as a result of which the fabric will not thereafter show the usual pilling effect upon abrasion. 95

The small residual of treating liquid, e.g., diethylene glycol, remaining in the fabric after treatment, washing and drying, is detectable by heating the dried finished fabric with a hot iron or the like at a temperature 100 sufficient to effect softening of the fibres and vaporization of the diethylene glycol. The vaporized diethylene glycol is easily detectable in this test by its characteristic odor, which is given off when the fabric is heated 105 to the necessary high temperature.

The synthetic fibres "DACRON," "ORLON" Registered Trade Marks and nylon specified herein are those produced commercially by E. I. du Pont de Nemours & Company and well known in the trade under those respective names. A more technical identification of each of these materials is as follows:

"DACRON"—A condensation polymer 115 of terephthalic acid and ethylene glycol.

"ORLON"—Acrylonitrile polymer, usually combined with other substances.

Nylon—A group of thermoplastic linear long-chain superpolyamides. 120

What we claim is:—

1. A process for treating textile fabrics comprising synthetic polyester or acrylic or long-chain polyamide fibres to minimize pilling effects on abrasion comprising treating 125 the fabric, at a temperature of at least 350°F. but not sufficient to harm the fabric with a liquid which is inert to the fabric treated at the treatment temperature having its boiling point above the temperature of treatment. 130

washing the thus treated fabric to remove substantially the treating liquid and subsequently drying the fabric.

2. A process as claimed in Claim 1 where-
5 in the liquid is a non-aqueous water soluble liquid that quickly heats the fabric to the temperature of the liquid and effects rapid penetration of the fabric fibres by the liquid.

3. A process as claimed in Claim 1 where-
10 in the liquid is ethylene glycol or diethylene glycol, or glycerine or mineral oil.

4. A fabric containing fibres of a condensation polymer of terephthalic acid and ethylene glycol known as "DACRON" (Regis-
15 tered Trade Mark) fibres, as defined herein, treated by the process of any of Claims 1 to 3.

5. An acrylonitrile polymer known as "ORLON" (Registered Trade Mark) fabric,
20 as defined herein, treated by the process of any of Claims 1 to 3.

6. A nylon fabric treated by the process

of any of Claims 1 to 3.

7. A process for treating textile fabrics containing fibres of a condensation polymer
25 of terephthalic acid and ethylene glycol known as "DACRON" (Registered Trade Mark) fibres substantially as described with reference to Example 1.

8. A process for treating textile fabrics
30 containing acrylonitrile polymer fibres known as "ORLON" (Registered Trade Mark) fibres substantially as described with reference to Example 2.

9. A process for treating nylon fabrics sub-
35 stantially as described with reference to Example 3.

10. A fabric treated by the process of any of Claims 1 to 3 or 7 to 9.

FONTAINE CONVERTING WORKS.

INCORPORATED,

Per: BOULT, WADE & TENNANT,
111/112, Hatton Garden, London, E.C.1,
Chartered Patent Agents.

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